KAMENETSKAYA, D. S.

USSR/Chemistry - Alloys, Structure of
Chemistry - Systems, Components of Binary

Jan 1948

"The Influence of the Molecular Interaction on the Phase Equilibrium in Binary Systems," V. I. Danilov, D. S. Kamenetskaya, Sci Res Inst of Ferrous Metal, Moscow, 11¼ pp

"Zhur Fiz Khim" Vol XXII, No 1

Study dependence of basic types of structural diagrams on molecular bonds. Obtain equilibrium equations for binary two-phase systems. Analyze these equations. Based on this, it is possible to come to the conclusion that the type of diagram representing the structure of binary systems conforms to that showing the binding energy of single and multiple molecules in the two phases. Explains simple type of structural diagram. Submitted 5 May 1947.

PA 65T12

KAMENETSKAYA, D. S. PA 65T11

USSR/Chemistry - Alloys, Structure of Jan 1948
Chemistry - Systems, Components of Binary

"Dependence of the Structural Diagram of Binary Alloys Upon Molecular Interaction," D. S. Kamenetskaya, Sci Res Inst of Ferrous Metal, Moscow, 9 pp

"Zhur Fiz Khim" Vol XXII, No 1

Submits geometric method for analysis of thermodynamic potential calculated according to Becker-Pines' method. Roozeboom's method was used to study various types of structural diagrams and their relation to intermolecular interaction. Submitted 5 May 1947.

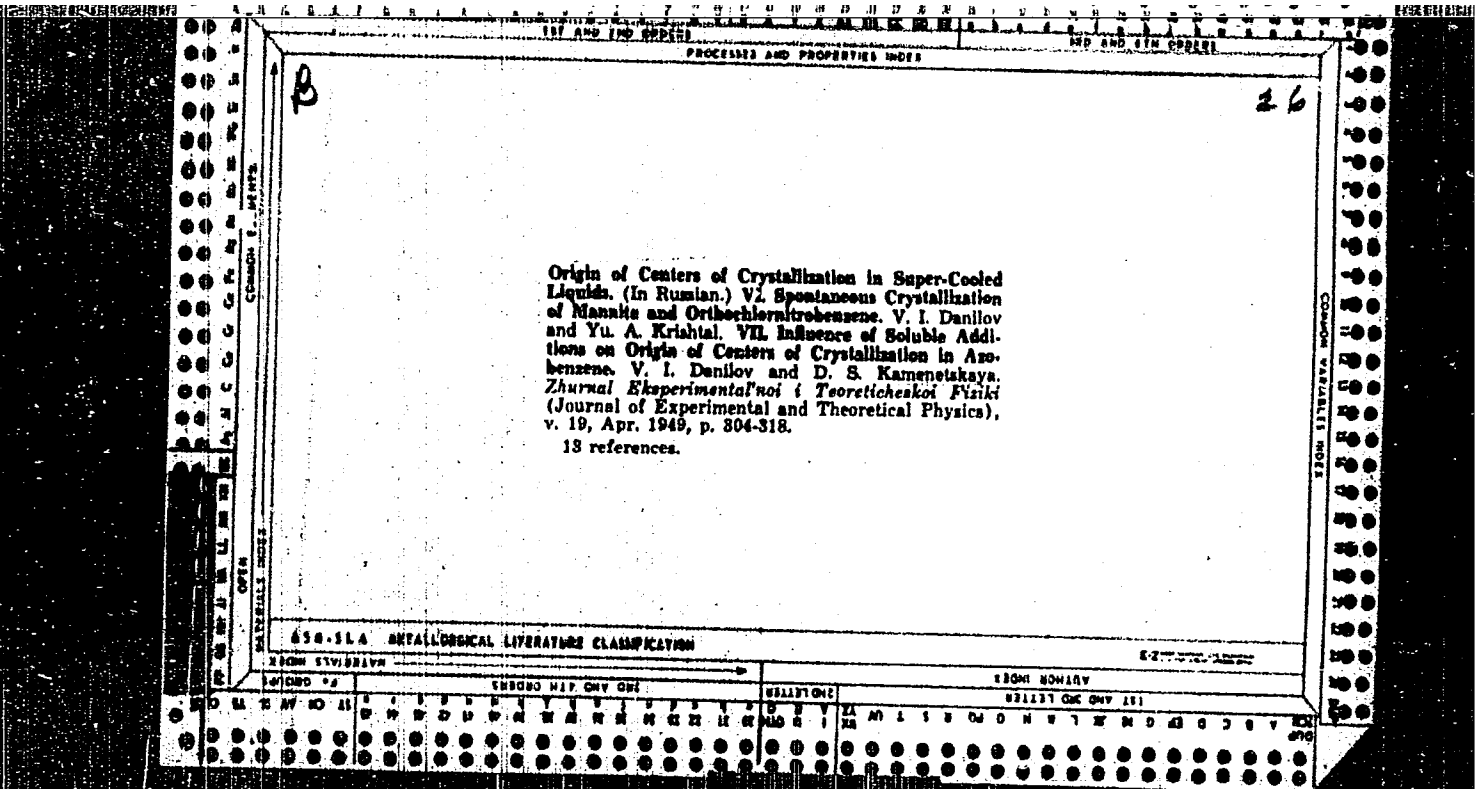
[redacted] 65T11

Evaluation B-7911g

KAMENETSKAYA, D.S., kand.fiz.-mat.nauk

Influence of molecular interaction on the type of constitution diagram. Probl.metalloved.i fiz.met. no.[1]:113-131 '49. (MIRA 11:4)

1.Laboratoriya kristallizatsii TSentral'nogo nauchno-issledovatel'skogo instituta chernoy metallurgii.
(Phase rule and equilibrium)



Origin of Centers of Crystallization in Super-Cooled Liquids. (In Russian.) VI. Spontaneous Crystallization of Mannite and Orthochlornitrobenzene. V. I. Danilov and Yu. A. Krishtal. VII. Influence of Soluble Additions on Origin of Centers of Crystallization in Azobenzene. V. I. Danilov and D. S. Kamenetskaya. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki* (Journal of Experimental and Theoretical Physics), v. 19, Apr. 1949, p. 304-318.

13 references.

KAMENETSKAYA, D. S.

PA 38/49T110

USSR/Physics
Liquids, Supercooled
Crystallization

Apr 49

"The Formation of Crystallization Centers in Supercooled Liquids: VII, The Influence of Soluble Admixtures on the Formation of Crystallization Centers in Azobenzene," V. I. Danilov, D. S. Kamenetskaya, Inst Metallophys, Cent Sci Res Inst of Ferrous Metal, 6 pp

"Zhur Eksper i Teoret Fiz" Vol XIX, No 4

Studied the influence of admixtures, soluble in liquid phase and insoluble in solid phase, upon

[redacted]

38/49T110

USSR/Physics (Contd)

Apr 49

the formation of crystallization centers in supercooled azobenzene. Showed that small admixtures of piperonal, benzoic acid, and ethyl alcohol increase the supercooling of the azobenzene. Evaluated the surface tension on the crystal-supercooled azobene boundary, the activitation energy, and the kinetic coefficient, Submitted 23 Sep 48.

[redacted]

38/49T110

M

"The Influence of Small Additions of Potassium on Nucleation in Supercooled Mercury." V. I. Danilov and D. S. Kamenetskaya (*Doklady Akad. Nauk S.S.S.R.*, 1949, **68**, (4), 677-680).—[In Russian]. The valuable property potassium has of considerably reducing the surface tension at the boundary between the liquid and vapour phase of mercury made it likely that a similar effect might occur at the boundary between a crystal and liquid. However, the observed effect on crystallisation when the temp. was reduced at a rate of 2·5° C./min. differed widely from specimen to specimen. The width of the temp. interval varies with concentration of potassium from 2° C. (0·05% potassium) to 5° C. (1%); for pure mercury it is 3° C. If the supercooling does not proceed too far, crystallization is usually due to activating additions. Increasing the concentration of the potassium results in more intense and rapid crystallization, so that the supercooling cannot go so far; this is true up to a concentration of 0·5% potassium; then the trend is reversed. The surface tension at the liquid/solid surface of separation is found to be 7·7 ergs/cm.²; this value is considerably reduced by admixtures up to 0·03% potassium, but further increase beyond that amount does not produce any further changes. The activation energy is increased by up to 82·5% (at 1% potassium).—B. F. K.

Oct. 1949

KAMENETSKAYA, D. S.

PA 174T65

USSR/Physics - New Techniques 11 Sep 50
Metals - Mercury, Sodium

"'Spheroidization' of Metallic Particles," V. I. Danilov, D. S. Kamenetskaya, Inst Metal Sci Phys of Metals, Cen Sci Res Inst of Ferrous Metals

"Dok Ak Nauk SSSR" Vol LXXIV, No 2, pp 237-240

Dependence of time for beginning of smoothing of surface upon temp for various samples of pure sodium and sodium with mercury admixt (0.35 atomic %). Describes subject new phenomenon where round, small, hard particles are formed near mp. Submitted 19 Jun 50 by Acad I. P. Bardin.

174T65

KAMENETSKAYA D.S.

DANILOV, V.I.; KAMENETSKAYA, D.S., kand. fiz.-mat. nauk.

Effect of soluble admixtures on crystal nuclei formation in supercooled liquids. Probl. metalloved. i fiz. met. no.2:3-18 '51. (MIRA 11:4)

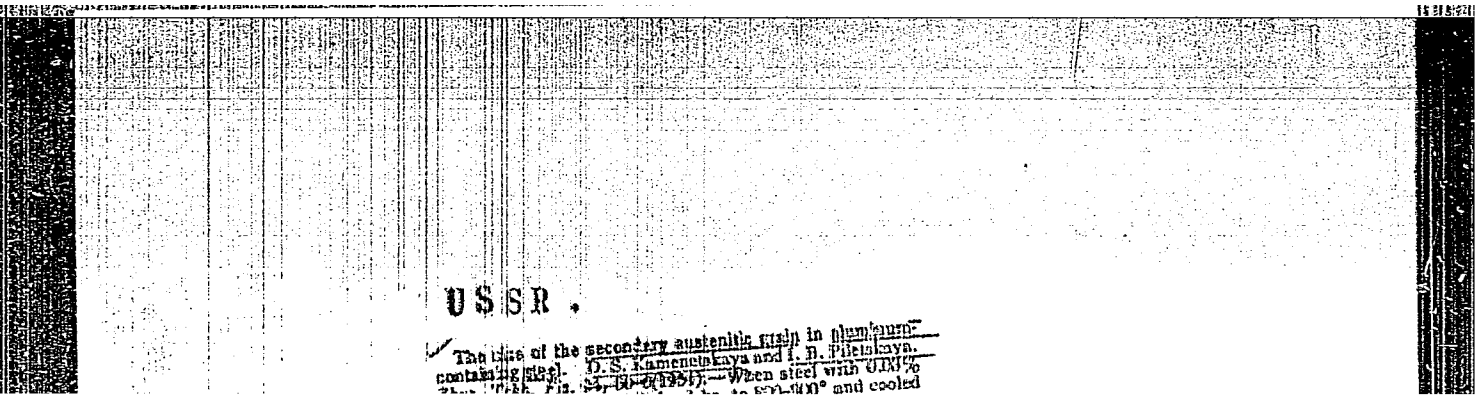
1. Chlen-korrespondent AN USSR (for Danilov).
(Crystallization)

KAMENETSKAYA, D.S.

DANILOV, V.I.; KAMENETSKAYA, D.S., kand. fiz.-mat. nauk.

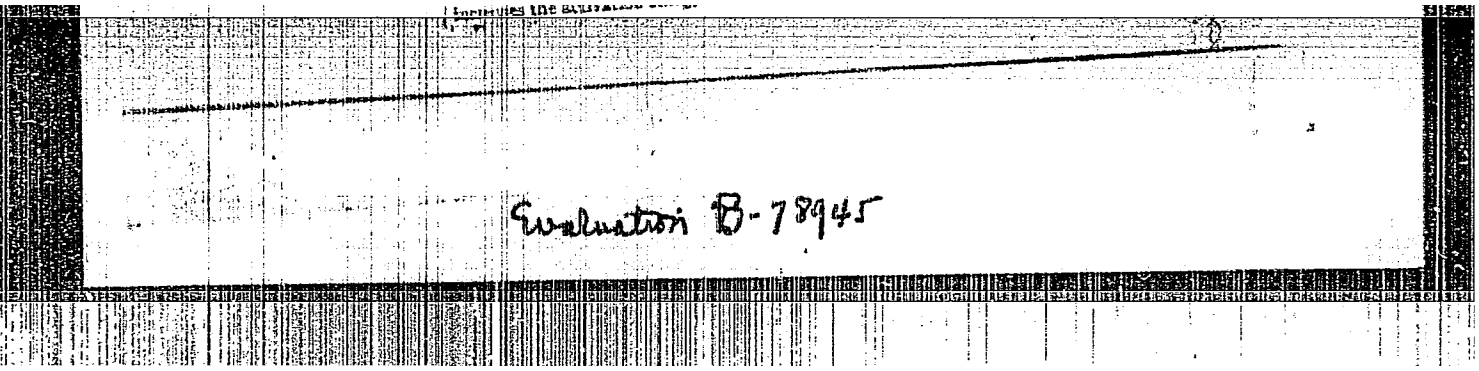
"Spheroidization" and recrystallization of solidified sodium droplets. Probl. metallovod. i fiz. met. no.2:19-24 '51. (MIRA 11:4)

1. Chlen-korrespondent AN USSR.
(Crystallization) (Sodium)



USSR

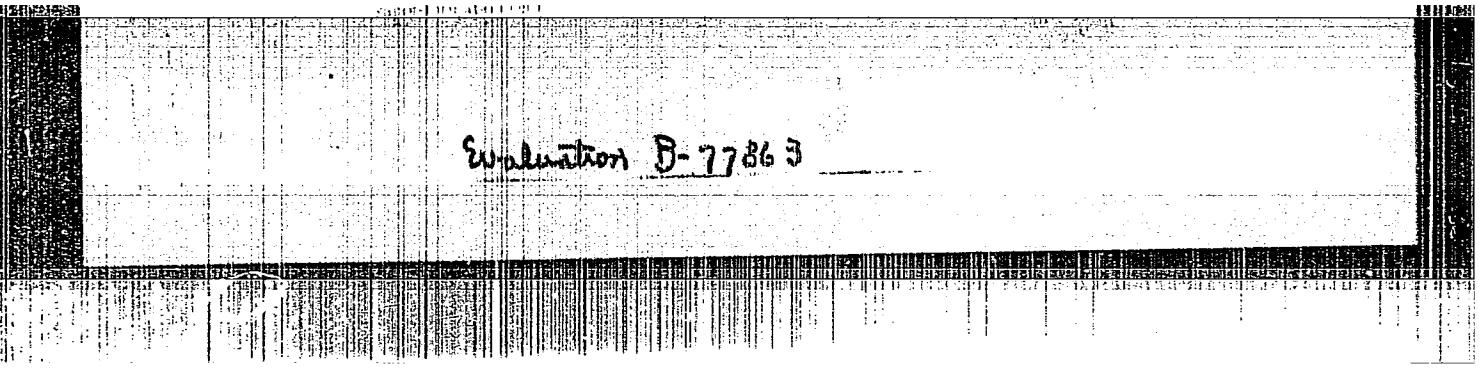
The time of the secondary austenitic crash in aluminum-containing steel. D. S. Kamenetskaya and I. B. Pilets-kaya. [illegible] (1957). — Ween steel with 0.1M% [illegible]° and cooled



KAMENETSKAYA, D. S.

Superheating of a solid in vacuum. D. S. Kamenetskaya and I. D. Pilet'skaya. *Doklady Akad. Nauk SSSR* 98, 639-41(1954).—The fact that a substance can be fused in a vacuum only while its vapor pressure at the fusion temp. is lower than the vacuum is directly derived thermodynamic-

62



KAMENETSKAYA, D.S., kand.fiz.-mat.nauk

Effect of intermolecular interaction on the behavior of solutions. Probl. metalloved. i fiz. met. no.4:92-102 '55. (MIRA 11:4)
(Molecular dynamics) (Solutions (Chemistry)

KAMENETSKAYA, D.S., kand.fiz.-mat.nauk; PILETSKAYA, I.B.

Mechanism of the effect of aluminum on secondary austenite grain in steel. Probl. metalloved. i fiz. met. no.4:103-112 '55. (MIRA 11:4)
(Steel--Metallography) (Aluminum) (Austenite)

KAMENETSKAYA, D.S., kandidat fiziko-matematicheskikh nauk; LYUBOV, B.Ya., kandidat fiziko-matematicheskikh nauk; ROSENBERG, V.M., kandidat tekhnicheskikh nauk.

"Metallography." S.S.Shteinberg. Reviewed by D.S.Kanenetskaia, B.IA.Liubov, V.M.Rosenberg. Stal' 15 no.1:95-96 Ja '55. (MLRA 8:5)

1. Organizatsiya VNITOM pri TsNIICHM.
(Metallography) (Physical metallurgy) (Shteinberg, S.S.)

DANILOV, Vitaliy Ivanovich, professor,doktor fiziko-matematicheskikh nauk, laureat Stalinskoy premii; KURDYUMOV, G.V., akademik, redaktor; DANILOVA, A.I., redaktor; ZUBKO, A.M., redaktor; KAMENETSKAYA, D.S., redaktor; LASHKO, A.S., redaktor; OVSIYENKO, D.Ye., redaktor; SKRYSHEVSKIY, A.F., redaktor; SPEKTOR, Ye.Z., redaktor; KAZANTSEV, B.A., redaktor izdatel'stva; RAKHLINA, N.P., tekhnicheskiy redaktor

[Structure and crystallization of liquids; selected articles] Stroenie i kristallizatsiia zhidkosti; izbrannye stat'i. Pod red. G.V.Kurdiumova. Kiev, Izd-vo Akademii nauk UkSSR, 1956. 566 p. (MLRA 9:10)

1. Deystvitel'nyy chlen AN USSR (for Danilov)
(Liquids) (Crystallization)

KAMENETSKAYA, D. S.

Category : USSR/Solid State Physics - Phase Transformation in Solid Bodies E-5

Abs Jour : Ref Zhur - Fizika, No 3, 1957, No 6631

Author : Kamenetskaya, D.S., Filatskaya, I.B., Rakhmanova, E.P.
Title : Effect of Superheating Liquid Steel on its Crystallization

Orig Pub : Fizika metallov i metallovedeniye, 1956, 2, No 2, 254-258

Abstract : The effects of superheating liquid steel and of the soluble and insoluble impurities on its structure were studied. The subjects of the investigation were carbon steel with 0.42% carbon, 0.7% manganese, containing no aluminum, and Kh27 steel with 27% chromium, 0.08% carbon and 0.6% manganese. The melting was in Al_2O_3 crucibles in vacuum high-frequency furnaces. All batches were poured at the same temperature into a cold mold to eliminate the influence of heat removal on the size of the grain. It is shown that in the case of steel of either brand, whether molten in air or in vacuum, the size of the grain increases with increasing superheat and duration of the soaking in the liquid state, and the character of the cast structure changes. It was observed that increasing

Card : 1/2

KAMENETSKAYA, D.S.; PILETSKAYA, I.B.

Development of vacuum metallurgy abroad (From foreign journals). Stal' 16 no.1:72-79 '56. (MLRA 9:5)

1. Institut metallovedeniya i fiziki metallov TSentral'nogo nauchno-issledovatel'skogo instituta chernoy metallurgii.
(Electrometallurgy)

AUTHOR: Kamenetskaya, D. S.

TITLE: The effect of admixtures on the formation of crystallization centers in a supercooled liquid

SOURCE: Rost kristallov; doklady na Pervom soveshchanii po rostu kristallov, 1956 g. Moscow, Izd-vo AN SSSR, 1957, 39-47

TEXT: A brief summary is first given of the causes and nature of crystallization and the probability of the formation of crys-

of admixtures which may be activated). Small quantities of soluble admixtures may hinder or facilitate crystallization by exerting an effect on surface tension and activation energy for the formation of crystal nuclei. Active insoluble admixtures may serve as ready crystallization centers; similar effects are obtained by the addition of soluble surface-active additives to the liquid, which reduce supercooling necessary for the formation of crystallization centers. These effects are illustrated [illegible] from Soviet work. There are 6 figures.

Kamenetskaya, D. S.

137-1957-12-23416

Translation from: Referativnyy zhurnal, Metallurgiya, 1957, Nr 12, p 83 (USSR)

AUTHORS: Kamenetskaya, D. S., Piletskaya, I. B., Rakhmanova, E. P.

TITLE: The Effect of Overheating on the Crystallization of Liquid Steel (Vliyaniye peregreva zhidkoy stali na yeye kristallizatsiyu)

PERIODICAL: V sb.: Fiz-khim. osnovy proiz-va stali. Moscow, AN SSSR, 1957, pp 683-689, Diskus. 781-791. See RZhMet, 1957, Nr 1, 404

ABSTRACT: Bibliographic entry

1. Liquid steel-Crystallization-Thermal effects 2. Bibliography

KAMENETSKAYA, D. S.

Akad. nauk SSSR, Inst. metallurgii

Use of Vacuum in Metallurgy (cont.) 533 Moscow, Izd-vo AN SSSR, 1958. 165pp/ 49

Trans. of a Conf. on Use of Vacumn in Ferrous Metallurgy (ed. SAMARIN, A. M.)

Kamenetskaya, D.S. Some Theoretical Questions of Vacuum Metallurgy

Author's conclusions: 1. In the vacuum melting of metals and alloys, there must exist over the metal a pressure somewhat exceeding the vapor pressure of the metal at the triple point. At a lower pressure, the metal volatilizes. When the vapor pressure of the metal is less than 0.01 mm. of mercury, the [required] pressure is created by the vapors themselves; at higher vapor pressures--0.1 mm. and above--it is necessary to increase the external pressure, e.g., by the use of an inert gas. 2. The degree of vacuum, or purity of gas, necessary for degasifying the metal and for minimum reaction with the gases remaining in the furnace depends on the vapor pressure of the metal: the lower the vapor pressure, the higher the vacuum, or the purer the inert gas, must be. The vapors over the metal, provided their pressure is high enough (0.01 mm. and above) form a protective envelope, which plays an important part in the melting of the metal if the vapors react with the gas. 3. In selecting materials for crucibles, protective covers for thermocouples, stoppers, graphite parts, etc., it is necessary to take into consideration the vapor and dissociation pressures of these materials, and also their possible reactions with the metal and with each other, accompanied by the liberation of volatile matter. 4. It is most advisable to conduct the

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vacuum refining of metal with the aid of substances like carbon and hydrogen, which form volatile compounds with certain addition agents. There are 6 references, of which 4 are Soviet, 1 is English and 1 German.

Yemyashev, A.V. Some Notes on the Technology of the Vacuum Melting of Metals and Alloys (Experience Gained in the Operation of a Vacuum Furnace for Refractory Metals)

The article is divided into the following sections: Brief description of the OKB-264A furnace; Operation of the furnace; Temperature measurement; Taking metal samples during the melting period; Method of preventing hanging of the charge. There is one English reference.

Stroyev, A.S., Ivanov, A.M. and Ovsepyan, Ye.S. Vacuum Melting of Molybdenum in an Electric Arc Furnace 62

Authors' conclusions: 1. High-vacuum melting of molybdenum in an electric arc furnace is feasible and yields metal of high purity. 2. Ingots of molybdenum melted in a vacuum of the order of 0.003 mm. of mercury and with proper deoxidation are free of defects in the central zone, regardless of the speed of cooling after melting.

AUTHOR: Gulyayev, B.B. SOV/24-58-4-37/39

TITLE: Conference on Crystallisation of Metals (Soveshchaniye po kristallizatsii metallov)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, 1958, Nr 4, pp 153 - 155 (USSR)

ABSTRACT: This conference was held at the Institut mashinovedeniya AN SSSR (Institute of Mechanical Engineering of the Ac.Sc. USSR) on June 28-31, 1958. About 400 people participated and the participants included specialists in the fields of foundry, metallurgy, crystallography, physics, welding, heat, physical chemistry, mathematical physics and other related subjects. In addition to Soviet participants, foreign visitors included Professor D. Czikl (East Germany) and N.I. Chvorinov (Czechoslovakia). This conference on crystallisation of metals was the fourth conference relating to the general problem of the theory of foundry processes.

Conference on Crystallisation of Metals SOV/24-58-4-37/39

General Problems of Crystallisation of Metals

Member of the Ac.Sc. Belorussian SSR N.N. Sirota, in his paper "On the Mechanism of the Process of Crystallisation", proposed a general physico-mathematical theory on germination and the growth of crystals and described its application to problems of crystallisation of metals.

Corresponding Member of the Ac.Sc. Ukrainian SSR K.P. Bunin and Yu.N. Taran, in their paper "Eutectic Crystallisation of Grey Irons", considered the features of formation of graphite separations in eutectic alloys from the point of view of the general theory of crystallisation of iron.

B.Ya. Lyubov, in his paper "Calculation of the Speed of Solidification of Metals in Large Volumes", proposed a synthesis of the molecular-kinetic and of the thermal theories of crystallisation of metallic castings.

A.G. Spasskiy, in the paper "Fundamental Factors Influencing the Structure of Castings" and M.V. Mal'tsev in the paper "Methods of Improving the Quality of Cast Metal", described results of their investigations of crystallisation of castings from various alloys and considered methods of controlling such processes.

I.L. Mirkin dealt with the influence of fluctuations in the concentration on the formation of crystallisation nuclei and formation of crystals in complex alloys.

G.P. Ivantsov gave a review of the present concepts on germination and the growth of crystals. O.N. Magnitskiy, A.A. Demidova and B.B. Gulyayev considered the influence of the speed of crystallisation and the composition of the alloys on the quantitative characteristics of the structure and the mechanical properties of castings of the systems iron-carbon and aluminium-silicon. D.S. Kamenetskaya, N.P. Rakhmanova and Ye.Z. Spektor dealt with the results of investigation of the kinetics of crystallisation of iron and its alloys. G.F. Balandin proposed a mathematical theory of formation of the structure of castings and applied it for elucidating the features of crystallisation of iron. Ya.V. Grechnyy dealt with the features of crystallisation of binary alloys of various types.

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SOV/137-59-1-351

Translation from: Referativnyy zhurnal. Metallurgiya, 1959, Nr 1, p 43 (USSR)

AUTHOR: Kamenetskaya, D. S.

TITLE: Certain Theoretical Aspects of Vacuum Metallurgy (Nekotoryye teoreticheskiye voprosy vakuumnoy metallurgii)

PERIODICAL: V sb.: Primeneniye vakuuma v metallurgii. Moscow, AN SSSR, 1958, pp 49-53

ABSTRACT: The author examines the effects of pressure (P) on the fusion of metals in vacuum. In order to achieve fusion of a substance, the P acting on it must exceed the vapor pressure of the substance at its triple point. If the P of the system is lower than the P of the vapors at the triple point, the metal will be sublimated. In actual practice metals with a high vapor pressure, e.g., Fe and Ni, may be successfully melted at low P's. Owing to evaporation, a cloud of metallic vapor with an increased P is formed above the metal thus ensuring the fusion of the latter; the measuring equipment employed, however, registers the P existing at a considerable distance from the smelting crucible. As the temperature is increased, the P over the metal increases also. At a certain temperature, this P exceeds

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Certain Theoretical Aspects of Vacuum Metallurgy (cont.)

the P of the triple point and the metal begins to melt. Unless special measures are taken during vacuum heating of substances possessing high vapor pressure (Cr, Mg, Ca), sublimation of the substances will result. In order to avoid sublimation, it is imperative either that the crucible be tightly covered or the metal be heated rapidly. In order to attain fusion of a metal with high vapor pressure, it is essential that a P be created over the surface of the metal with the aid of an inert gas, so that the P attained exceeds the P of the triple point.

B. L.

78-3-3-13/47

AUTHOR: Kamenetskaya, D. S.

TITLE: On the Problem of the Calculation of the Fusion Diagrams of Binary Systems (K voprosu o raschete diagramm plavkosti binarnykh sistem)

PERIODICAL: Zhurnal Neorganicheskoy Khimii, 1958, Vol.3, Nr 3, pp.607-610 (USSR)

ABSTRACT: In the construction of the fusion diagrams of binary systems difficulties occur above all by the inexact determination of the beginning and the end of fusion as well as by the calculation of the equilibrium curves on the basis of the data at room temperature. The disagreements between the calculated and the experimentally determined values in the construction of the fusion diagrams are to be explained by the fact that many simplifications are introduced in calculations for the free energy. For the calculation of the fusion diagram in binary systems the following equation in a reduced form was used:

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1

78-3 3-13/47

On the Problem of the Calculation of the Fusion Diagrams of Binary Systems

$$kT = \frac{U'x^2 - U''y^2 + kq_A T_A}{q_A - \ln \frac{1-x}{1-y}} = \frac{U'(1-x)^2 - U''(1-y)^2 + kq_B T_B}{q_B - \ln \frac{x}{y}}$$

t = fusion temperature
x and y = concentration of the components
u_1 and u_2 = energy for the existing phases
kq = entropy of fusion
T_A and T_B = fusion temperature of the components
k = Boltzmann's constant

By the above-mentioned equation the fusion diagram in the system gold-platinum was calculated. In the construction of the phase diagram by means of the equilibrium equation the graphic method can also be employed. The theoretical calculation for the solidus line highly differs by the experimentally found solidus line. By the electron theory of the metals and the thermodynamic theory of the solutions it is evident that the phase diagram of the metals are not accompanied by simple, but by very complicated processes. With the aid of

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On the Problem of the Calculation of the Fusion Diagrams of Binary Systems

these theories some parts of the phase diagrams can be determined. There are 1 figure and 17 references, 10 of which are Soviet.

ASSOCIATION: Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii
(Central Scientific Research Institute for Ferrous Metallurgy)

SUBMITTED: June 25, 1957

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SOV/129-58-9-6/16

AUTHORS: Kamenetskaya, D. B. and Zelenov, A. N., Engineers

TITLE: Influence of the Pressure of an Inert Gas in the Smelting Furnace on the Gas Content in the Metal (Vliyaniye davleniya inertnogo gaza v plavil'noy pechi na soderzhaniye gazov v metalle)

PERIODICAL: Metallovedeniye i Obrabotka Metallov, 1958, Nr 9, pp 27-28 (USSR)

ABSTRACT: A neutral gas of sufficient purity protects the metal from interacting with O_2, H_2 and N_2 in the same way as vacuum does. However, as regards the speed of extracting gasses from the metal, an inert gas is not equivalent to vacuum. Therefore, the authors considered it interesting to investigate the influence of the degree of rarefication of an inert gas on the rate of extraction of the gases from the metal. For the investigations a chromel alloy was chosen (10% Cr, rest Ni) which was molten in a high frequency vacuum furnace without slag and without deoxidising agents in magnesite crucibles. The weight of the ingot was 400 g; after preliminary rarefication to 10^{-2} mm Hg, argon (containing 0.3% O_2 and 0.5% N_2) was introduced

Card 1/3

Influence of the Pressure of an Inert Gas in the Smelting Furnace on the Gas Content in the Metal

into a system with a total volume of about 30 litres. The alloy was smelted at argon pressures equalling 1, 10, 20, 50, 100, 300 and 450 mm Hg. There were two series of heats, in the first one of which the metal was maintained in the liquid state for three minutes and in the other for ten minutes. The determined dependence of the argon pressure on the partial oxygen pressure is entered in a table, p 27, and the given data indicate that an increase in the argon pressure from 1 to 450 mm Hg corresponds to an increase in the oxygen pressure from 10^{-3} to 1 mm Hg. The results of the gas analysis of the chromel castings produced under various conditions are entered in a table, p 28. The following conclusions are arrived at: With increasing holding time of the metal in the liquid state in the atmosphere of an inert gas, the gas content decreases; with increasing pressure of the inert gas the total content of the gases in the metal increases; if the inert gas contains oxygen, it must be purified from it if the pressure is such that the partial pressure of the oxygen

SOV/129-58-9-6/16

Influence of the Pressure of an Inert Gas in the Smelting Furnace on the Gas Content in the Metal

in the gas exceeds 0.01 mm Hg.
There are two tables.

ASSOCIATION: TsNIIChM

1. Vacuum furnaces--Performance 2. Vacuum furnances--Test results
3. Metals--Production 4. Liquid metals--Chemical reactions
5. Metals--Properties

Card 3/3

KAMENETSKAYA, D. S.

The Third prize (imeni D. K. Chernov) was awarded to Engineers D. S. Kamenetskaya, E. P. Nakhmanova, Ye. Z. Spektor and V. I. Shiryayev (TsNIICHM) for their paper "On the Mechanism of the Influence of Aluminium on the Crystallization of Iron".

Results of the 1958 Competition for Obtaining imeni D. K. Chernov and imeni N. A. Minkevich Prizes, Metallovedeniye i termicheskaya obrabotka metallov, 1959, No. 6, pp 62-64

Kamenetskaya, D.S.

18(0) p4,7,8 PHASE I BOOK EXPLOITATION SOV/2125

Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii. Institut Metallovedeniya i fiziki metallov

Problemy metallovedeniya i fiziki metallov (Problems in Physical Metallurgy and Metallophysics) Moscow, Metallurgizdat, 1959. 540 p. (Series: Its: Sbornik trudov, 6) Errata slip inserted. 3,600 copies printed.

Additional Sponsoring Agency: USSR. Gosudarstvennaya planova komissiya.

Ed. of Publishing House: Ye.N. Berlin; Tech. Ed.: P.G. Islent'yeva; Editorial Board: D.S. Kamenetskaya, B.Ya. Lyubov (Resp. Ed.), Ye.Z. Spektor, L.M. Utevskiy, L.A. Shvartsman, and V.I. Malkin.

PURPOSE: This book is intended for metallurgists, metallurgical engineers, and specialists in the physics of metals.

COVERAGE: The papers in this collection present the results of investigations conducted between 1954 and 1956. Subjects

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covered include crystallization of metals, physical methods of influencing the processes of crystallization, problems in the physical chemistry of metallurgical processes, development of new methods and equipment for investigating metals, and production control. References follow each article.

TABLE OF CONTENTS:

PART I. CRYSTALLIZATION OF METALS

steel with the aid of seed crystals. It was shown that modifying additions of titanium and boron diminish the capacity of Kh23N18 steel for significant supercooling. Titanium and boron, at concentrations which produce minimum supercooling of the melt, refine the dendritic structure at rapid rates of solidification.

Neymark, V.Ye., and A.I. Dukhin. Effect of Modifying Agents on the Structure, Skin Deformation, and Solidification Rate of Steel Ingots 39

Skin defects were revealed in ingots of four types of steel (St. 3, Kh27, Kh23N18, and Kh18N9) by the vacuum-crystallization method. It was found that modifying agents (titanium, zirconium, and boron) reduce skin deformation and accelerate the skin-solifidication rate of these steels in varying degrees. The results obtained suggest that it would be advisable to investigate the possibility of using modifying agents for lessening skin deformation and increasing the skin-solidification rate in the continuous casting of steel.

Kamenetskaya, D.S., Candidate of Physical and Mathematical Sciences; E.P. Rakhmanova; Ye.Z. Spektor; and V.I. Shiryayev. The Mechanism of the Effect of Aluminum on the Formation of Crystallization Centers in Liquid Iron 63

Liquid primary iron (electrolytic and direct-reduction) containing no active undissolved impurities or surface-active dissolved impurities can easily be supercooled 260-270° C, below the melting point. Nonactivated particles of Al_2O_3 have little effect on the development of crystallization centers in iron. But the start of the crystallization process in iron containing particles of Al_2O_3 has an activating effect on the particles and results in a decrease in supercooling capacity. The introduction of small quantities of aluminum into iron sharply reduces the supercooling capacity. The small degree of supercooling in such cases is in accord with the fact that additions of aluminum to steel act to refine the grain. In view of the results of this investigation and others, this effect may be explained by the fact that small additions of aluminum decrease the energy of nucleation in liquid iron. Because of the surface activity of aluminum, nucleation can take place spontaneously with but slight supercooling, as a result of which a fine-grained cast structure is obtained.

It was found that the heat of transfer of sulfur from iron to slag in the system $FeO-SiO_2$, saturated with silica, is decreased by the addition of CaO to the slag. At a concentration of about 20 percent CaO the heat of reaction amounts to some 13,000 cal./g. atom, which coincides with the heat of transfer of sulfur from iron to ferruginous slag. Further, on increasing the content of CaO in the slag, a certain increase in entropy takes place. An overall result of these processes is a reduction in the value of the coefficients of sulfur distribution in comparison with acid slag not containing CaO. The introduction of Na_2O into the slag causes the same phenomenon to take place, but in a greater degree. These

facts may be explained by the specific interaction of ions in the acid fusion. The free energy of solution of solid iron sulfide in ferruginous and ferruginous-silicate slags was calculated. It was shown that the heat of transfer of phosphorus from iron to acid slag does not differ from the corresponding figure in the case of ferruginous slag. The coefficients of diffusion of phosphorus, however, are considerably less in the first case than in the second. This can be explained by the presence of a "structure" of silicate polymers in the acid slag. Additions of CaO and Na_2O to acid slag increase the heat of reaction of dephosphorization, and at the same time the values of the coefficients of distribution rise.

S/137/62/000/005/071/150
A006/A101

AUTHORS: Kamenetskaya, D.S., Rakhmanova, E. P., Spektor, Ye. Z., Shiryayev, V. I.

TITLE: On the mechanism of the aluminum effect upon the nucleation of crystallization centers in liquid iron

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 5, 1962, 3, abstract 5I16 ("Sb. tr. In-t metalloved. i fiz. metallov Tsentr. n.-i. in-ta chernoy metallurgii", 1959, v. 6, 63-75)

TEXT: The authors investigated the effect of low Al admixtures upon Fe-crystallization. Electrolytic Fe (99.76%) and Fe of direct reduction (99.86%) were used as initial materials. It is shown that liquid original Fe, that does not contain active non-soluble impurities and surface active admixtures, is easily supercooled by 260 - 270°C below the melting point. It is supposed that under the described conditions the crystallization centers arise spontaneously. Addition of 0.03% Al eliminates supercooling almost completely. In repeated remelting, supercooling did not increase. On the basis of this fact and also because of the sharp refining of ingot grains, the authors conclude that Al

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On the mechanism of the aluminum ...

acts as a surface-active admixture which reduces the development of crystallization nuclei. The assumption on the effect of Al as an deoxidizer is disproved by the fact that in the experiments with the addition of Al_2O_3 particles, crystallization set in at a greater supercooling than during the addition of Al metal. There are 20 references.

D. Ovsiyenko

[Abstracter's note: Complete translation]

66164

~~18 (4)~~ 18.7530

AUTHORS: Kamenetskaya, D. S., Rakhmanova, E. P., SOV/20-128-5-16/67
Spektor, Ye. Z., Shiryayev, V. I.

TITLE: On the Mechanism Underlying the Effect of Aluminum on the Crystallization of Iron

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 128, Nr 5, pp 924 - 926 (USSR)

ABSTRACT: The authors first give a brief discussion of previous articles concerned with the afore-mentioned problem. This article explains the mechanism underlying the effect of aluminum on the formation of crystallization centers. There is no method available for metals which could be applied to the calculation of the number of crystallization centers. The tendency of liquids to undercooling may, however, be employed for characterizing the rate of center development. If the development of crystallization centers in a given liquid is complicated, a great amount of energy is consumed and the liquid shows great tendency to undercooling. If the crystallization center is formed in the given liquid without difficulty, only a small amount of energy is required and the liquid is undercooled but little. By measuring the degree of undercooling it is possible to de-

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On the Mechanism Underlying the Effect of Aluminum on the Crystallization of Iron

termine the factors influencing the formation of crystallization centers so that the character of this influence may be explained. The authors used the electronic color pyrometer TsEP-2M. By special experiments on the maintenance of the metal in undercooled state it was found that the measured surface temperature corresponded to that inside the liquid metal. Fusion took place in aluminum pots of a vacuum furnace. The authors investigated directly reduced iron (99.86%) and electrolytic iron (99.94%). The elimination of the influence exerted by the impurities is briefly described. Diagram 1 shows a typical curve of iron undercooling, plotted by the device TsEP-2M. The maximum undercooling attained by the authors was 270-290°. The iron was maintained in undercooled state for about 1.5 minutes and crystallized rapidly as soon as it had attained a certain degree of undercooling. Various experiments were made in order to check the present concept of the effects of aluminum on the grain size due to the formation of aluminum oxide particles. The following results were obtained: The Al_2O_3-particles produced in the alloy by chemical reaction of Al with Fe_2O_3 have no effect on the

On the Mechanism Underlying the Effect of Aluminum on the Crystallization of Iron

undercooling of iron and, accordingly, do not serve as crystallization centers. The metallic aluminum dissolved in iron has, in fact, an effect on the undercooling of liquid iron. The experiments on the undercooling of iron without and with additions of Al, Al_2O_3, and Fe_2O_3 were repeated many times, they yielded, however, always the same results. The microstructure of the cast pieces was simultaneously investigated. Slightly undercooled iron containing impurities is coarse-grained, but strongly undercooled iron is fine-grained. Iron containing additions of aluminum is also fine-grained despite the lack of noticeable undercooling. The structure of iron with impurities depends on the number of strange particles at which crystallization centers may be formed. Accordingly, aluminum added to iron acts as a surface-active admixture. There are 1 figure and 7 references, 5 of which are Soviet.

ASSOCIATION: Institut metallofiziki Tsentral'nogo nauchno-issledovatel'skogo instituta chernoy metallurgii (Institute of Metal Physics of the Central Scientific Research Institute for Ferrous Metallurgy)

Kamenetskaya, D.S.

PHASE I BOOK EXPLOITATION SOV/4344

Soveshchaniye po teorii liteynykh protsessov, 4th

Kristallizatsiya metallov; trudy soveshchaniya (Crystallization of Metals; Transactions of the Fourth Conference on the Theory of Casting Processes) Moscow, Izd-vo AN SSSR, 1960. 325 p. 3,200 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut mashinovedeniya. Komissiya po tekhnologii mashinostroyeniya.

Resp. Ed.: B. B. Gulyayev, Doctor of Technical Sciences, Professor; Ed. of Publishing House: V. S. Rzheznikov; Tech. Ed.: S. G. Tikhomirova.

PURPOSE: This book is intended for metallurgists and scientific workers. It may also be useful to technical personnel at foundries.

COVERAGE: The book contains the transactions of the Fourth Conference (1958) on the Theory of Casting Processes. [The previous 3 conferences dealt with hydrodynamics of molten metals (1955), solidification of metals (1956), and shrinkage processes in castings (1957)]. General problems in the crystallization of metals, including the crystallization of constructional steels, alloy steels with special properties, cast iron, and of nonferrous alloys, are discussed. Recognition is given to D. K. Chernov and N. T. Gudtsov and their students, B. B. Gulyayev and A. G. Spasskiy, for their contributions to the understanding of the basic problems involved in the theory of crystallization of ferrous and nonferrous metals and alloys. Academician A. V. Shubnikov is also mentioned in connection with his work on the planning of research on crystal formation. References accompany several of the articles.

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KAMENETSKAYA, D.S.

PHASE I BOOK EXPLOITATION SOV/4199

Leningrad. Politekhnicheskiy institut

Sovremennyye dostizheniya liteynogo proizvodstva; trudy mezhvuzovskoy nauchno-tekhnicheskoy konferentsii (Recent Achievements in Founding: Transactions of the Scientific and Technical Conference of Schools of Higher Education) Moscow, Mashgiz, 1960. 336 p. Errata slip inserted. 4,000 copies printed.

Resp. Ed.: Yu. A. Nekhendzi, Doctor of Technical Sciences, Professor; Eds.: N. G. Girshovich, Doctor of Technical Sciences, Professor, and K. P. Lebedev, Docent; Managing Ed. for Literature on Heavy Machine Building (Leningrad Department, Mashgiz): Ye. P. Naumov, Engineer; Tech. Eds.: Ye. A. Dlugokanskaya, and L. V. Shchetinina.

PURPOSE: This book is intended for the technical personnel of foundries. It may be used by students of the field.

COVERAGE: This collection of articles discusses problems in founding processes. Individual articles treat the melting

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of metals and their alloys, mechanization and automation of casting processes, aspects of the manufacture of steel, cast iron, and nonferrous metal castings. No personalities are mentioned. References accompany individual articles.

TABLE OF CONTENTS:

KAMENETSKAYA, D.S.

PHASE I BOOK EXPLOITATION SOV/4548

Akademiya nauk SSSR. Komissiya po fiziko-khimicheskim osnovam proizvodstva stali

Primeneniye vakuuma v metallurgii (Use of Vacuum in Metallurgy) Moscow, Izd-vo AN SSSR, 1960. 334 p. Errata slip inserted. 4,500 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut metallurgii imeni A.A. Baykova. Komissiya po fiziko-khimicheskim osnovam proizvodstva stali.

Resp. Ed.: A.M. Samarin, Corresponding Member, Academy of Sciences USSR; Ed. of Publishing House: G.M. Makovskiy; Tech. Ed.: S.G. Markovich.

PURPOSE: This collection of articles is intended for technical personnel interested in recent studies and developments of vacuum steelmaking practice and equipment.

COVERAGE: The book contains information on steel melting in vacuum induction furnaces, and vacuum arc furnaces, reduction processes in vacuum, and degassing of steel and alloys. The functioning of apparatus and equipment, especially vacuum furnaces and vacuum booster pumps is also analyzed. Personalities are mentioned in connection with some of the articles and will appear in the Table of Contents. Three articles have been translated from English. Some of the

AVAILABLE: Library of Congress

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29322

S/020/61/137/001/014/021
B103/B201

18.7560 1145, 1418, 1413

AUTHOR: Kamenetskaya, D. S.

TITLE: Separation of alloy components when there is a difference in temperature

PERIODICAL: Doklady Akademii nauk SSSR. v. 137, no. 1, 1961, 94-95

TEXT: The author was concerned with the problem of the separation of alloy components from the viewpoint of the energetic advantage of thermal diffusion. This involved the question as to the limits and the direction within which the process may take place regardless of the rate of atom motion. To begin with, the author clarified the problem as to whether the process of the redistribution of an impurity in an initially homogeneous solid body in the presence of a heated zone is of any advantage energetically. She proceeded from the assumption of a part of the body (a bar) having a low temperature (T_1) and the remaining part being heated to a higher temperature (T_2). As an example, the author examined the case

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of a limited solubility of the components in the solid state. The initial concentration of the impurity in the bar is designated by C_o, the solubility of the impurity in the solid substance to be purified by C_1 (at the temperature T_1), and by C_2 (at the temperature T_2) (Fig. 1). The condition $C_1 < C_o < C_2$ must be complied with (the solubility increases with temperature). A further case is possible: $C_1 < C_o < C_2'$. The author evaluated the change of free energy in the case that the impurity, due to heating of a part of the body up to T_2, was redistributed such that the impurity content in the cold part of the bar decreased (C_1) and approached the limit of solubility at T_1. It was presupposed in this connection for the impurity content to rise in the hot part and to approach solubility at T_2. In the case of a limited solubility, the free energy of an alloy will depend on concentration as illustrated in Fig. 2. For a temperature T_1 the equilibrium solubilities will be C_1 and C_1'

whereas they will be C_2 and C_2' for T_2. The change of free energy in the redistribution of the impurity will be as follows:

$\Delta F = 1/2 \ (F_{T_1,C_1} + F_{T_2,C_2} - F_{T_1,C_o} - F_{T_2,C_o})$ (1). (The indices indicate the values of free energy at the respective temperatures and concentrations). The following relation was obtained on the basis of the lever law: $F_{T_1,C_o} = \frac{C_1'-C_o}{C_1'-C_1} F_{T_1,C_1} + \frac{C_o-C_1}{C_1'-C_1} F_{T_1,C_2'}$ (2). After substituting (2) in (1) and after allowing for a simplification, the relation reads:

$2\Delta F = - \frac{C_o-C_1}{C_1'-C_1} (F_{T_1,C_1'} - F_{T_1,C_1}) - (F_{T_2,C_o} - F_{T_2,C_o})$ (3). It is inferred from (3) that for certain ratios between the values contained in (3), the free energy of the system may decrease under given conditions ($\Delta F < 0$), and the redistribution process of the impurity will be of

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advantage energetically. In particular, this will hold true for $F_{T_1,C_1'} > F_{T_1,C_1}$ and for $F_{T_2,C_o} > F_{T_2,C_2}$. (These are sufficient, but not necessary conditions). An effective purification of the cold end of the bar will extend as far as the limit of solubility of the impurity at the temperature of this bar end. A further redistribution will be possible only as far as such values of C_1 and C_2, where ΔF is vanishing.

These facts permitted the conclusion that in calculating the process of zonal melting it is necessary that in addition to the redistribution of impurities due to their different solubility in the liquid and the solid state, the possible redistribution due to the temperature difference along the specimen to be purified be also taken into account. In the author's opinion, the aforesaid holds true for liquid mixtures as well. Condition (3) is realized if a function is used for the free energy $F_{T,C}$, that expresses the energy dependence on concentration and on temperature. There are 2 figures.

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20322

Separation of alloy... S/020/61/137/001/014/021
B103/B201

ASSOCIATION: Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii
(Central Scientific Research Institute of Ferrous Metallurgy)

PRESENTED: October 12, 1960, by G. V. Kurdyumov, Academician

SUBMITTED: October 12, 1960

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Separation of alloy...

S/020/61/137/001/014/021
B103/B201

Legend to Fig. 1: Constitution diagram of the eutectic type;
Legend to Fig. 2: Curves of free energy as a function of concentration for two temperatures T_1 and T_2 (see Fig. 1)

Fig. 1

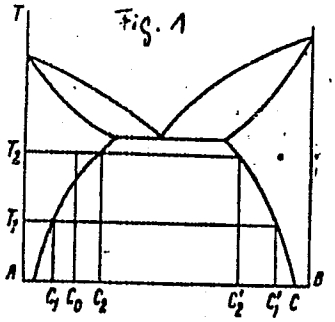
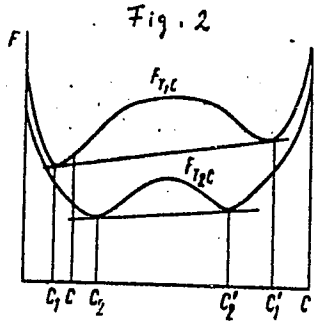


Fig. 2



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34748

S/020/62/142/003/015/027
B142/B138

18.7520

AUTHORS: Kamenetskaya, D. S., Rakhmanova, E. P., Spektor, Ye. Z.

TITLE: Crystallization of supercooled binary alloys

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 142, no. 3, 1962, 584-586

TEXT: The crystallization characteristics of supercooled alloys were studied on systems forming a continuous series of solid solutions: Sb-Bi, Cu-Ni, Fe-Ni, Fe-Cr. The former two systems were studied most thoroughly; their phase diagrams show a wide gap between the liquidus (T_l) and solidus (T_s) curves. The mechanisms observed hold for all the systems investigated. The alloys were produced in refractory crucibles of Al_2O_3, quartz, or ZrO_2 in high-frequency vacuum furnaces. Electrolytic Fe, Ni, Cu, and Cr were used; Bi and Sb were refined by the zone melting. Thermal, metallographic, and X-ray diffraction analyses were made. For supercooling below T_s, the liquid metal had to be first superheated. The supercooling ranges are divided into three sections according to their

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Crystallization of supercooled...

cooling curves, macro- and microstructures, and X-ray diffraction patterns. These three sections approximately correspond with their different crystallization mechanisms (except for some shifts at low temperatures) to the following ranges of the phase diagram:
I: $T_l - T_o$; II: $T_o - T_s$; III: below T_s (considerable supercooling)
(T_l = liquidus curve, T_s = solidus curve, T_o = crystallization temperature).
Section I: On crystallization a solid phase is formed with a different composition from that of the liquid phase - diffusion process.
Section III: The crystallized solid phase has the same composition as the liquid one - "diffusionless" process .
Section II: The two processes are mixed: Part of the alloy crystallizes "diffusionless", and for thermodynamic reasons decomposes into the more stable, two-phase state. The rest crystallizes by the diffusion process. "Diffusionless" crystallization was achieved by supercoolings below T_s.
For 1:1 Cu-Ni alloy, e. g., where T_l = 1310°C, T_s = 1240°C, I is the supercooling range 10 - 30°C, II 40 - 100°C, and III 110 - 150°C. There are 4 figures and 8 references: 6 Soviet and 2 non-Soviet. The reference
Card 2/3

to the English-language publication reads as follows: W. T. Olsen, R. Hultgren, Journal of Metals, 188, no. 2, 1323 (1950).

ASSOCIATION: Institut metallovedeniya i fiziki metallov Tsentral'nogo nauchno-issledovatel'skogo instituta chernoy metallurgii im. I. P. Bardina (Institute of Metal Science and Physics of Metals of the Central Scientific Research Institute of Ferrous Metallurgy imeni I. P. Bardin)

PRESENTED: June 27, 1961, by G. V. Kurdyumov, Academician

SUBMITTED: June 16, 1961

Card 3/3

S/020/62/143/003/025/029
B101/B144

AUTHORS: Aptekar', I. L., and Kamenetskaya, D. S.

TITLE: Thermodynamics of phase transformations in binary alloys

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 143, no. 3, 1962, 636 - 639

TEXT: The authors study the change in free energy associated with phase transformation in binary alloys in dependence on df_a, the energy change associated with phase transformation owing to diffusion (redistribution of the components), and df_o, energy change associated with phase transformation owing to capture of atoms of the second component. The equation $df = a_2(\partial f_2/\partial C_2 - \partial f_1/\partial C_1)dC_2 + [f_2(C_2) - f_1(C_1) + (C_1 - C_2)\partial f_1/\partial C_1]da_2$ is derived. $a_2 = N_2/N$, where N_2 is the number of atoms in the second phase, N the total number of atoms; C_1, C_2 are the concentrations of atoms of type A in the first and second phase; f_1, f_2 are the specific free energies of the first and second phase, respectively. The authors discuss the

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possible partial equilibria and phase transitions in the case of (a) unchanged quantity of both phases (the interface is not displaced); (b) constant concentration of the second phase; (c) change in the quantity and composition of both phases during the phase transition. If the system is not in equilibrium, the velocity of the transition processes depends on Δf, the deviation of the free energy from the value of equilibrium. For the velocity of these processes the authors give:
$V_{diff} = A_{diff}\exp(-q_{diff}/kT)\left[1 - \exp(-\Delta f_a/kT)\right]$; and
$V_{capt} = A_{capt}\exp(-q_{capt}/kT)\left[1 - \exp(-\Delta f_c/kT)\right]$. A_{diff} is a coefficient containing the diffusion coefficient; q_{diff} is the activation energy of the process; A_{capt} is a coefficient which includes the mobility of atoms during the capture process, q_{capt} the activation energy of this process. The temperature range below T_1, the top limit of the phase equilibrium, can be divided into three intervals: (1) $T_1 - T_o$; a phase transition with redistribution of components is energetically advantageous here; (2) $T_o - T_D$: both processes are possible, but redistribution is quicker; (3)

below T_D the phase transformation without change in composition is quicker. If $T_o > T_D > T_S$ (T_S = lower temperature limit of the two-phase range), the process takes place in two stages: first, phase transformation without change in concentration, then, decomposition of the metastable second phase into two phases. There are 6 references: 5 Soviet and 1 non-Soviet.

ASSOCIATION: Institut metallofiziki i Institut pretsizionnykh splavov Tsentral'nogo nauchno-issledovatel'skogo instituta chernoy metallurgii im. I. P. Bardina (Institute of Physics of Metals and Institute of Precision Alloys of the Central Scientific Research Institute of Ferrous Metallurgy imeni I. P. Bardin)

PRESENTED: September 11, 1961, by G. V. Kurdyumov, Academician

SUBMITTED: September 2, 1961

S/137/62/000/003/106/191
A060/A101

AUTHORS: Gorbatenko, A. K., Kamenetskaya, D. S.

TITLE: On the shape of equilibrium curves of binary alloys

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 3, 1962, 7, abstract 3I42 ("Sb. tr. In-t metalloved. infiz. metallov. Tsentr. n.-i. in-ta chernoy metallurgii", 1959, 6, 191-195)

TEXT: Using the example of a state diagram of a system demonstrating the formation of a continuous series of solid solutions and using a particular case (the Au - Pt system), an analysis was carried out of the variation in the shape of equilibrium curves (in particular, of the solidus line) as a function of a change in the parameters characterizing the intermolecular interaction. There are 8 references.

Z. Rogachevskaya

[Abstracter's note: Complete translation]

Card 1/1

S/081/62/000/017/019/102
B166/B180

AUTHORS: Kamenetskaya, D. S., Rakhmanova, E. P., Spektor, Ye. Z., Shiryayev, V. I.

TITLE: Mechanism of the influence of aluminum on nucleation in molten iron

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 17, 1962, 51, abstract 17B347 (Sb. tr. In-t metalloved. i fiz. metallov Tsentr. n.-i. in-ta chernoy metallurgii, v. 6, 1959, 63 - 75)

TEXT: Supercooling measurements were made, to study the kinetics of crystal nucleation in molten iron (electrolytic and that obtained by direct reduction) and the influence of Al and its oxides. It was found that molten iron is easily supercooled by 260 - 270°C. The introduction of 0.03% Al reduces the amount of supercooling by up to ~10%. Al_2O_3 particles only affect the supercooling of Fe (reducing it) after their activation, which is the result of the repeated remelting of the iron containing them. [Abstracter's note: Complete translation.]

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S/081/62/000/017/016/102
B166/B180

AUTHORS: Gorbatenko, A. K., Kamenetskaya, D. S.

TITLE: The shape of the equilibrium curves of binary alloys

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 17, 1962, 47, abstract 17B314 (Sb. tr. In-t metalloved. i fiz. metallov Tsentr. n.-i. in-ta chernoy metallurgii, v. 6, 1959, 191-195)

TEXT: An equation is suggested which shows the relation between the constitution diagram and the parameters which characterize the interaction between the components of a system (concentrations, entropies, heats of melting and melting points of the components, and mixing energies of both phases) for binary alloys forming continuous series of solid solutions. The equation has been tried out on the Au - Pt system. The experimental liquidus line of this system was found to coincide with the theoretical. [Abstracter's note: Complete translation.]

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S/137/62/000/003/058/191
A006/A101

AUTHORS: Zelenov, A. N., Kamenetskaya, D. S.

TITLE: On the effect of inert gas pressure in the furnace upon the gas content in the metal

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 3. 1962, 38, abstract 30259 ("Sb. tr. In-t metalloved. i fiz. metallov Tsentr. n.-i. in-ta chernoy metallurgii", 1959, v. 6, 187 - 190)

TEXT: The authors investigated the content of O, H and N in alloy Cr 10% + Ni 90% during melting under argon pressure, equal to 1, 10, 20, 50, 100, 300 and 450 mm Hg. The argon contained 0.3% O_2 and 0.5% N_2. An increase in the argon content caused a higher O content than in the initial alloy; metallographical inspection revealed Cr_2O_3 in the ingots. In case that O be present in argon or nitrogen, they should be purified. The N and H content in the alloy does practically not depend on argon pressure and is considerably lower than in the initial alloy.

[Abstracter's note: Complete translation] A. Tseydler

Card 1/1

40683

S/126/62/014/002/018/018
E193/E383

18.7500

AUTHORS: Aptekar', I.L. and Kamenetskaya, D.S.

TITLE: The effect of pressure on nucleation of solid phases in a melt

PERIODICAL: Fizika metallov i metallovedeniye, v. 14, no. 2, 1962, 316 - 318

TEXT: The results of several investigations concerned with the effect of pressure on the mode of solidification of molten metals are in apparent contradiction. According to M. Hasselblatt (Zs. anorg. u. allgem. Chem., 1921, 119, 353) and A.I. Bykhovskiy (Ukr. fiz. zhurnal, 1958, 3; no. 4, 488), when external pressure is applied to a melt the curves representing the variation in the rates of nucleation and growth of the solid-phase particles are shifted into a temperature range, that corresponds to the degree of undercooling approximately the same as that attained under atmospheric pressure, and the final structure of the solidified metal remains unaffected. According to Belousov, Dodonov and Varich (Kristallizatsiya metallov, (Metal Crystallisation) Moscow, AN SSSR, 1960, pp. 279, 298) solidification under pressure

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The effect of pressure ....

leads to grain-refinement of the final structure. The present authors show that both views are correct and that the apparent contradiction is due to the fact that the pressure in the experiments described in the first two references remained constant throughout the solidification process, whereas it increased from zero to a predetermined level in the work reported in the next two references mentioned above. They show that the effect of pressure on the rate of nucleation and growth of solid-phase particles in a melt depends on the temperature of the melt at the moment at which the pressure is first applied and on the rate at which it increases. They claim that even a relatively small pressure can have a considerable effect on the final structure if it is applied to an undercooled melt. For any given temperature there is, however, a threshold pressure which must be exceeded if the application of pressure is to have any significant effect. The findings on the effect of static pressure are applied to an analysis of the effect of ultrasonics on the solidification process with particular reference to features which are common to both static and dynamic pressure.

Card 2/3

APTEKAR', I.L.; KAMENETSKAYA, D.S.

Thermodynamics of phase transitions in binary alloys. Dokl. AN SSSR 143 no.3:636-639 Mr '62. (MIRA 15:3)

1. Institut metallofiziki i Institut pretsizionnykh splavov TSentral'nogo nauchno-issledovatel'skogo instituta chernoy metallurgii im. I.P.Bardina. Predstavleno akademikom G.V. Kurdyumovym.
(Alloys—Thermal properties)(Phase rule and equilibrium)

S/126/62/014/003/004/022
E039/E420

AUTHORS: Aptekar', I.L., Kamenetskaya, D.S.

TITLE: On the theory of phase changes in binary systems

PERIODICAL: Fizika metallov i metallovedeniye, v.14, no.3, 1962, 358-365

TEXT: It is necessary to take the following three processes into account: (1) reorganization of the lattice; (2) redistribution of components between phases through the phase boundary, i.e. by means of an exchange process; (3) equalization of composition in each phase. The energy requirements for the first two processes are considered as well as the ratio of their velocities for four temperature ranges. In the region between the liquidus temperature T_l and the temperature of equal free energies T_0 between the two phases only component exchange can occur and this is limited by diffusion in each phase. For temperatures between T_0 and the temperature of the solidus T_s, when $T_D < T_s$ (T_D is the temperature at which the velocities of lattice reorganization and component redistribution are equal), or between T_0 and T_D, when $T_D > T_s$, it is possible for the type of phase

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transition to change from one dominated by lattice reorganization to another dominated by component redistribution. In the temperature range T_s to T_D, when $T_D < T_s$, both component redistribution and lattice reorganization occur simultaneously and, after the phase transition is completed, the equalization of composition will continue (with sufficient soaking). For temperatures below T_D the lattice reorganization process dominates. The boundaries between these temperature ranges is not sharp and some overlap occurs. The differences in structure and degree of uniformity in binary alloys (Cu-Ni, Sb-Bi and Fe-Ni) are detected by metallographic and X-ray analysis methods. There are 2 figures.

ASSOCIATION: Institut metallovedeniya i fiziki metallov TsNIIChM (Institute of Science of Metals and Physics of Metals TsNIIChM)

SUBMITTED: March 12, 1962

APTEKAR', I.L.; KAMENETSKAYA, D.S.

Effect of pressure on the nucleation of a new phase. Fiz. met. i metalloved. 14 no.2:316-318 Ag.'62. (MIRA 15:12)

1. Institut pretsizionnykh splavov i Institut metallovedeniya i fiziki metallov TSentral'nogo nauchno-issledovatel'skogo instituta chernoy metallurgii.

(Crystallization)

KAMENETSKAYA, D.S.; RAKHMANOVA, E.P.; SPEKTOR, Ye.Z.

Certain characteristics of the crystallization of supercooled binary alloys. Fiz. met. i metalloved. 19 no.4:583-591 Ap '65.
(MIRA 18:5)

1. Institut metallofiziki TSentral'nogo nauchno-issledovatel'skogo instituta chernoy metallurgii imeni Bardina.

KAMENETSKAYA, D.S. (Moscow)

Analysis of the diagrams of state of binary systems at varying pressure. Zhur. fiz. khim. 38 no.1:73-79 Ja'64. (MIRA 17:2)

APTEKAR', I.L.; KAMENETSKAYA, D.S.

Diffusionless transformations in alloys. Probl. metalloved. i fiz. met. no.8:205-221 '64. (MIRA 18:7)

ACC NR: AR6013663 SOURCE CODE: UR/0058/65/000/010/E028/E028

AUTHOR: Aptekar', I. L.; Kamenetskaya, D. S.

TITLE: Diffusionless transformations in alloys

SOURCE: Ref. zh. Fizika, Abs. 10E217

REF SOURCE: Sb. tr. In-t metalloved. i fiz. metallov Tsentr. n.-i. in-ta chernoy metallurgii, vyp. 36, 1964, 205-221

TOPIC TAGS: alloy phase diagram, phase transformation, crystal lattice deformation

TRANSLATION: Conditions under which diffusionless transformations could theoretically occur are analyzed. A review of experimental research showed that the type of transformation is determined by experimental conditions such as cooling rate, supercooling, and the nature of the alloy (state diagram and concentration). Energy stimuli for the following two limiting processes are discussed: rearrangement of the lattice and exchange across the phase boundary and the bond with the state diagram. A qualitative analysis is made of the limits of the occurrence of diffusion, diffusionless and mixed processes. Kinetic parameters (activation energies and kinetic coefficients) which characterize exchange processes and rearrangements of the lattice must also be taken into account in a determination of a type of phase transformation besides electrical.

SUB CODE: 20,11

Card 1/1

KAMENETSKAYA, I. V.

"Effect of Meteorological Factors on the Self-Seeding of Plants in the Strelets Steppe," Byull. Mosk. Obshch. Ispytat. Prirody, Otdel. Biol., 54, No.4, 1949 pp. 89-100

BABICH, A. G.; GORDEYEVA, T. K.; KAMENETSKAYA, I. V.; LARIN, I. V.

Feeding and Feeding Stuffs

Ways of solving the forage problem in the Stalingrad Canal district. Bot. zhur. 37 no. 3, 1952. Botanicheskiy Institut im. V. L. Komarova, Akademii Nauk SSSR
Recd. March 10, 1952.

Monthly List of Russian Accessions, Library of Congress, September 1952. UNCLASSIFIED

KAMENETSKAYA, I.V.

Some discoveries in the flora of the Terek Kuma sands. Biul.MOIP. Otd. biol.61 no.3:73-78 My-Je '56. (MLRA 9:10)
(TEREK KUMA DESERT--BOTANY)

KORKUSHKO, O.V.; ZIL'BERMAN, D.B.; YANOVSKIY, A.D.; KAMENETSKAYA, I.Ya.; KRASHENINNIKOVA, N.G.; CHECHIK, E.A.

Some characteristics of the clinical aspects and treatment of the acute period of myocardial infarct in elderly and senile persons. Vop. geron. i geriat. 4:179-185 '65. (MIRA 18:5)

1. Institut gerontologii AMN SSSR i Kiyevskaya stantsiya skoroy meditsinskoy pomoshchi.

LENGAUER, N.A.; ZIL'BERMAN, D.B.; YANOVSKIY, A.D.; KAMENETSKAYA, I.Ya.; KRASHENINNIKOVA, N.G.; CHECHIK, E.A.; NEYMAN, B.G.; KORKUSHKO, O.V.

Organization and first results of the work of a specialized team to control thrombolic complications in Kiev. Vrach.delo no.1:108-109 Ja '63. (MIRA 16:2)

1. Kiyevskaya stantsiya skoroy meditsinskoy pomoshchi.
(KIEV—THROMBOSIS) (KIEV—EMBOLISM)

KAMENETSKAYA, L. S.

Solidification of Metals ; ( ) Trans. of 2nd Conf. on Theory of Foundry Processes, 56; Moscow, Mashgiz, 1958, 532pp.

Card 5/8

SOV/123-59-15-60466

Translation from: Referativnyy zhurnal. Mashinostroyeniye, 1959, Nr 15, p 222 (USSR)

AUTHOR: Kamenetskaya, L.S.

TITLE: On the Effects of Impurities on the Crystallization of Steel Ingots

PERIODICAL: V sb.: Zatverdevaniye metallov. Moscow, Mashgiz, 1958, pp 299 - 309

ABSTRACT: It is shown that the modern theory of crystallization of metals which was advanced by Fol'mer, on the basis of the thermodynamic works of Gibbs, was further developed by the works of Ya.I. Frenkel' (the theory of Gibbs-Fol'mer-Frenkel') and was confirmed in the works of V.I. Danilov and other scientists. A short account of this theory is given and the effects of insoluble active impurities and of additives lowering the surface tension (Al, Mg) on the crystallization of steel ingots are investigated from the point of view of this theory. The important role of additives (to the greater part of those lowering the surface tension) consists in reducing the degree of overcooling which is necessary at the beginning of the process. Considering these facts, the effects of

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SOV/123-59-15-60466

On the Effects of Impurities on the Crystallization of Steel Ingots

impurities on the crystallization in the volume of ingot and the structure (grain, size, development of individual structural zones) are made clear. The general tendency of the work: A joint examination of the internal and external factors effecting the formation of the cast structure (i.e. the nature of crystallizing liquids and heat transfer). 5 figures, 17 references.

O.S.M.

Card 2/2

KAMENITSKAYA, R.A.

22054 Kamenetskaya, R. A. Blizhayshiye Rezul'taty vaktsinatsii po kal'mettu detey i podrostkov. (Kratkoye Soderzhaniye Kand dissertatsii). Uchen. Zapiski Nauch-issled. in-ta tuberkuleza u Odesse, Ch. 1, 1948, s. 89-91

SO: Letopis' Zhurnal'nykh Statey, No. 29, Moskva, 1949.

USSR/Medicine - Tuberculosis May/Jun 49
Medicine - Vaccination

"Initial Results of Tests Conducted to Determine the Effectiveness of Antituberculosis Vaccination in Older Children," R. A. Kamenetskaya, Childrens' Dept, Odessa Sci Res Tuberculosis Inst, 3 pp

"Prob Tuber" No 3

Vaccinated 1,107 children 3 - 15 years old, and conducted observations on a group of 470 children of the same ages who had not been vaccinated to determine effectiveness of antituberculosis vaccination. Tabulated results. There were definitely

57/49T97

USSR/Medicine - Tuberculosis (Contd) May/Jun 49

less incidences in the vaccinated group, and scarification method was most effective.

57/49T97

KAMENTSKAYA, R. A.

TSESARSKAYA, S.I.; KAMENETSKAYA, R.A.; GOLUBOCHANSKAYA, Ye.M.

Effectiveness of BCG vaccination in children. Probl. tuberk., Moskva no.4:27-30 July-Aug 1953. (CIML 25:4)

1. Candidate Medical Sciences for Tsesarskaya and Kamenetskaya. 2. Of Odessa Scientific-Research Institute of Tuberculosis (Director -- Candidate Medical Sciences M. A. Brusnikin).

KAMENETSKAYA, R.M.; YAKUBOVSKIY, Yu.V.

Results of using ground currents in prospecting for polymetallic deposits. Razved.i okh.nedr 23 no.3:45-48 Mr '57. (MLRA 10:5)

1. Moskovskiy geologo-razvedochnyy institut im. S. Ordzhonikidze.
(Prospecting--Geophysical methods) (Terrestrial electricity)

KAMENETSKAYA, R.A., starshiy nauchnyy sotrudnik

Reaction of the organism to enteral vaccination with increased doses of BCG vaccine. Pat., klin. i terap. tub. no.8:25-28 '58. (MIRA 13:7)

1. Iz Odesskogo nauchno-issledovatel'skogo institutatuberkuleza.
(BCG VACCINATION)

KAMENETSKAYA, R. P.

PA 51T46

USSR/Medicine - Spirochetosis Mar 1948
Medicine - Epidemiology

"Analysis of Outbreak of Nonicteric Leptospirosis," R. P. Kamenetskaya, Leptospirosis Lab, Moscow Oblast Sci Res Inst Infectious Diseases imeni Mechnikov, Sanitary Epidemicl Detail No 112 SKVO, 1½ pp

"Sovets Medits" No 3

Epidemiologic and bacteriologic study of specific outbreak proved that it was leptospirosis, called L. grippotyphosa. Author succeeded for the first time in isolating L. grippotyphosa from two urine specimens through urinalysis. Leptospira, morphologically similar to septospira found in the blood and urine of

51T46

USSR/Medicine - Spirochetosis (Contd) Mar 1948

patients, were found in the water in the area of outbreak. Analyzes these specimens from the blood and urine of patients and from the water in the area of outbreak.

51T46

KAMENETSKAYA, R. P.

USSR/Medicine - Dysentery FD 139

Card 1/1

Author : Kamenetskaya, R. P. and Mel'nik-Sher, S. B.

Title : The effect of certain preparations which excite or inhibit the activity of the nervous system on the development of immunity in rabbits suffering from experimental Grigor'yev-Shiga dysentery

Periodical : Zhur. mikrobiol. epid. i immun. 4, 68-70, Apr 1954

Abstract : The effects of caffeine, magnesium sulfate, sodium bromide, and adrenalin on phagocytic reactions and the production of anti-agglutinins in rabbits infected experimentally with Grigor'yev-Shiga Dysentery are discussed. The manner of infecting the rabbits and the effects of each of the preparations on healthy control animals are also described. No references are cited.

Institution : The Sanitary-Epidemiological Detachment (Chief-Colonel of the Medical Service N. Ya. Zil'ber)

Submitted : October 12, 1953

USSR/Chemistry - Isopropanol
Chemistry - Oxidation

Feb 49

"Kinetics of Oxidizing Isopropanol in Acetone Using a Silver Catalyst," S. Ya. Pshezhetskiy, S. A. Kamenetskaya, Physicochem Inst imeni L. Ya. Karpov, Moscow, 20 pp

"Zhur Fiz Khim", Vol XXIII, No 2

Reaction occurs without formation of molecular hydrogen, i. e., not according to dehydrogen, i. e. not according to dehydrogenating mechanism. In the first stage reaction speed is proportional to oxygen concentration when there is an oxygen deficiency in the stoichiometric relation, and to isopropanol concentration when there is an excess of oxygen. Submitted 28 Apr 48.

PA 47/49T14

KAMENETSKAYA, S. A.

"Kinetics of Catalytic Oxidation of Isopropyl Alcohol Into Acetone Using Sliver as a Catalyst." Thesis for degree of Cand. Chemical Sci. Su 30 Jan 50, Sci Res Order, of Labor Red Banner Physicochemical Inst imeni L. Ya. Karpov

Summary 71, 4 Sep 52, Dissertations Presented for Degrees in Science and Engineering in Moscow in 1590. From Vechernyaya Moskva Jan-Dec 1950.

AUTHORS: Gribova, Ye. I., Kamenetskaya, S. A., Pshezhetskiy, S. Ya. 78-3-4-37/38

TITLE: The Specific Weight of Liquid Ozone (Udel'nyy ves zhidkogo ozona)

PERIODICAL: Zhurnal Neorganicheskoy Khimii, 1958, Vol. 3, Nr 4, pp. 1061-1062 (USSR)

ABSTRACT: The density of liquid ozone was determined by recording the pressure by the "Ozone-Manometer".
The mean density of liquid ozone at -183°C was determined by means of a glass manometer to amount to 1,572 ± 0,003 g/cm^3.
The mean density of liquid ozone at -183°C was determined by means of a sulfuric acid manometer to amount to 1,579 ± 0,003 g/cm^3.
The mean value of these two determinations which are also to be regarded as the specific weight of liquid ozone amounts to 1,575 ± 0,003 g/cm^3. There are 1 table and 3 references.

SUBMITTED: May 3, 1957

Card 1/1

AUTHORS: Kamenetskaya, S. A., Pshezhetskiy, S. Ya. 76-32-5-27/47

TITLE: Investigation of the Critical Conditions of the Ignition of Gaseous Ozone (Issledovaniye kriticheskikh usloviy vosplameneniya gazoobraznogo ozona)

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol. 32, Nr 5, pp.1122-1130 (USSR)

ABSTRACT: In earlier works the ignition of ozone was only investigated in the presence of hydrogen, bromine and hydrogen bromide, while in this work proof is given of the validity of the theory of thermal explosion according to N. N. Semenov also for the process mentioned in the title. From the method of the experiments can be seen that an analogous scheme to that of the work by Ya. B. Zel'dovich and N. N. Semenov (Ref 7) was used, just as well as an apparatus shown in a diagram. The ozone was obtained from an ozonizer of the Siemens type, the determinations of the function of the lower ignition area on the temperature in the interval of from -120° to +55° C and at pressures of from 8 to 220 torr being carried out.

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The function curve has a somewhat strange shape as on the one hand a catalytic decomposition of the ozone at the vessel walls can take place at higher temperatures, while at lower temperatures the ozone is absorbed at the walls. The experiments at higher pressure showed that there is apparently no upper area of ignition. The use of various inert gases showed a small influence, while steam had no influence at all, which is in agreement with the observations by Lewis and Feitknecht. The surface extension effected an increase of the pressure area, while the influence of the spark capacity on the lower area of ignition had regular character, corresponding to the data by Ref 7; thus the minimum energy of the ignition could be evaluated from the data obtained. The function of the lower area of ignition vs. the vessel diameter can be expressed by the formula P.d = const, where P denotes the critical ignition pressure and d the diameter. The activation energy computed according to N. N. Semenov coincides well with the data obtained, just as well as the computation of the criterion of the thermal explosion based on the equation by Frank-Kamenetskiy (Ref 9); this is a hint that the ignition of gaseous ozone is a thermal explosion.

Investigation of the Critical Conditions of the Ignition of Gaseous Ozone 76-32-5-27/47

There are 7 figures, 5 tables, and 11 references, 5 of which are Soviet.

ASSOCIATION: Fiziko-khimicheskiy institut im. L. Ya. Karpova Moskva (Moscow Institute of Physics and Chemistry imeni L.Ya. Karpov)

SUBMITTED: February 4, 1957

1. Ozone--Ignition 2. Ozone--Absorption
3. Ozone--Catalysis

Card 3/3

5(4)

AUTHORS: Kamenetskaya, S. A., Pshezhetskiy, S. Ya., SOV/76-32-1o-30/39
Slavinskaya, N. A.

TITLE: The Effect of Ozone on the Ignition of Hydrocarbons (Vliyaniye ozona na vosplameneniye uglevodorodov) I. The Ignition of Butane With Oxygen (I.Vosplameneniye butana s kislorodom)

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol 32, Nr 1o, pp 2430 - 2436 (USSR)

ABSTRACT: According to N.N.Semenov the ignition of hydrocarbons by oxygen represent an explosion. The kinetics of the ethane ignition was investigated by N.M.Chirkov and S.G.Entelis (Ref 1). A.B.Nalbandyan et al (Ref 2) as well as Pease and Schubert (Piz and Shubert)(Ref 3) investigated the use of ozone as activator in oxidation processes. In the present paper data on the ignition of butane are given; results of the investigations of butylene and cyclohexane will be given in later papers. The butane to be investigated was overdistilled in a

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The Effect of Ozone on the Ignition of Hydrocarbons. I. The Ignition of Butane With Oxygen SOV/76-32-10-30/39

Podbil'nyak column after its separation from unsaturated hydrocarbons. The ozone was obtained by a silent discharge from electrolytic oxygen. The investigations were made in an apparatus represented schematically with a butane-oxygen mixture of 80% of the stoichiometric amount being used. The effect of ozone was investigated by the stepwise exchange of O_2 by O_3 in the mixture (at a constant amount of oxygen atoms). Ozone drops the lower ignition limit and shortens the induction period. These effects increase with the ozone content and a drop of the temperature. Calculations showed that ozone decreases the effective activation energy. According to A.M.Markevich (Refs 9,10) the decomposition of ozone takes place according to the equation O_3 + wall $\rightarrow [O_2] + O$. The effect of ozone on the ignition may be explained by a reaction of ozone and atomic oxygen with carbon, as well as by an excess heat content of ozone; active centers that start the chain reaction may form. Two summarization processes take place:

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The Effect of Ozone on the Ignition of Hydrocarbons. SOV/76-32-10-30/39
I. The Ignition of Butane With Oxygen

I. $C_4H_{10}+6,5\ O_2 \rightarrow 4\ CO_2+5\ H_2O$ Q=635,5 coulomb/mol

II. $O_3 \rightarrow 1,5\ O_2$ Q= 34,5 coulomb/mol

By an increase in temperature the oxidation process is displaced by that of cracking, which was also observed by V.Ya.Shtern (Ref 11), and which explains the temperature effect observed. There are 4 figures, 4 tables, and 12 references, 9 of which are Soviet.

ASSOCIATION: Fiziko-khimicheskiy institut im.L.Ya.Karpova (Physical Chemical Institute imeni L.Ya. Karpov)

SUBMITTED: May 3, 1957

Card 3/4